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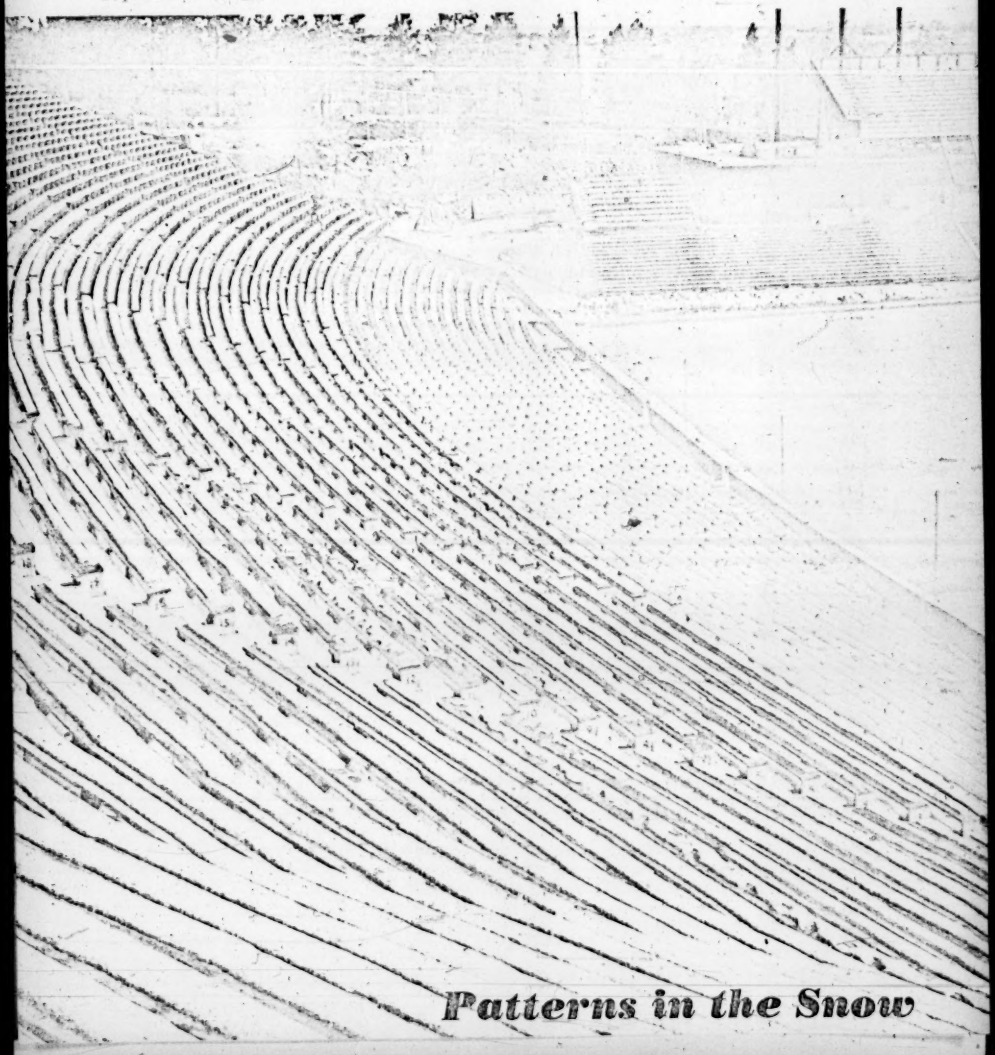
THE PHYSICS TEACHER



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References: Use as references only sources that are widely available. As a rule, scholarly journals and articles in languages other than English should not be cited. Number references in sequence mentioning each in the text at the proper point and collect them on a separate page placed at the end of the manuscript. The proper form is for reference to an article:

W.A. Hilton, Phys. Teach. **11**, 112 (1973).

or for reference to a book:

A. Koestler, *The Sleepwalkers* (MacMillan, New York, 1959), pp. 151–152.

Footnotes should be avoided.

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COVER: An artist's conception of Benjamin Franklin's famous kite experiment. See article on page 7. (Picture courtesy of Burndy Library, Norwalk, CT 06854)

letters

WHEN IS 10 x 10 NOT 10 x 10?

While preparing some "experimental data" for a laboratory exercise for one of my physics classes I was unable to arrive at the expected results when scaling up a "photograph" of the trajectories of particles undergoing collisions. This photograph I had drawn on graph paper. Much to my dismay I found that the K & E graph paper as reproduced in the laboratory manual *Laboratory Physics for the Life Sciences* by Howard Hayden, W.B. Saunders Co. (1975) is not 10 x 10 to the centimeter as indicated in the legend on the paper. The major divisions, incorporating ten of the subdivisions, are only about 0.9 centimeters apart. This apparent shrinkage of the graph paper is also evident in the paper labeled 10 x 10 to the 1/2 inch which is also included in this manual. This of course offers no difficulty when one places his own scale on the paper, but when measuring distances by counting boxes one has to take care when using this particular graph paper.

This may not be a unique situation and I would suggest to my colleagues that when using graph paper in the manner indicated they exercise caution if the graph paper was included as part of a laboratory manual.

RICHARD BRESLOW
University of Connecticut
Stamford, Connecticut 06903

SOUNDS AROUND A TUNING FORK II.

Dr. F. Crawford has kindly pointed out to me that there is a much better way of describing the intensity pattern around a tuning fork than the awkward way in which I tried it at the end of my letter [Phys. Teach. 13, 324, (1975)]. He refers to the publication[1] in which he describes the intensity pattern around a tuning fork as the radiation from a quadrupole source. Such a source sends out compressions along the plane containing the two prongs simultaneously with rarefactions along the plane which passes between the prongs at right angles to the former, and vice versa. This results in maximum intensity along these planes. Regions where there is no motion of the air, or nodal planes, will be found at 45° in between.

My letter was intended to assure that the observations are not interpreted as the interference of waves emanating from two line sources, as the title of the article to which I referred seemed to imply.

MARIO IONA
University of Denver
Denver, Colorado 80210

(Ed. note: A letter making the same point was received from Edgar A. Pearlstein, University of Nebraska, Lincoln, Nebraska 68588. M. Russell Wehr, Drexel University, Philadelphia, Pennsylvania 19104 wrote giving several references in which the effect was explained.)

Reference

1. F. S. Crawford, *Waves; Berkeley Physics Course*. (McGraw-Hill, New York, 1968), Vol 3, p. 532.

MORE ON THE MONTE CARLO EXPERIMENT

I have some comments on "Note on the Project Physics Monte Carlo Experiment" by Hubert P. Grunwald and Richard V. Mancuso [Phys. Teach. 13, 348 (1975)].

I encountered the same difficulties as the authors the first year I taught Project Physics and for the same reason. I arrived at a different solution to the difficulties. The marbles leaving the grid of nails are not collimated. Their velocities can assume any direction within an angle of about 103° for the marbles and board we use. Therefore, a marble at a given distance is a bigger target than the same marble at a greater distance, since it subtends a bigger portion of the possible 103° and therefore would be hit by more marbles.

I got around the difficulty by placing the target marbles the same distance from the last row of nails.

For more information on the grid of nails used to randomize the velocities of the marbles, see the description of the "Halton Board" in *Mathematical Recreations* by Maurice Kraitchik, published by W.W. Norton, Co.

ANGELINE C. DUFFY
Lincoln School
Providence, Rhode Island 02906

A SOCIETY FOR SPACE COLONIZATION

The colonization of space by humans has received an impetus from the ideas of Princeton University physicist, G.K. O'Neill.[1] I have found space colonization a stimulating topic for physics students of all levels. An exciting aspect of this topic is that it compels an interaction of knowledge from fields that are often not considered to be related. Successful space colonization will require the use of knowledge from disciplines ranging from astronomy, physics and engineering to agriculture, biology, ecology, medicine, psychology, political sciences, and perhaps religion as well. The interdisciplinary nature of the problems encountered also makes this topic of interest to nonscience majors and provides a convenient vehicle for describing the power and utility as well as the limits of modern science. This topic's popularity with the general public is evidenced by numerous recent newspaper and magazine articles and television programs.[2]

Teachers wishing to keep informed on space colonization

developments will find the L-5 Society newsletter helpful.[3] The stated long term goal of the L-5 Society is to organize a mass meeting on a space colony at the L-5 point of the Earth-Moon system.

JAY S. HUEBNER
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Jacksonville, Florida 32216

References

1. G.K. O'Neill, *Physics Today*, Sept. 1974, p. 32-40.
2. G.K. O'Neill, *Science Year 1976*, The World Book Science Annual; *Time*, May 26 and June 3, 1974; I. Asimov, *Saturday Review*, June 28, 1974, p. 12-17; *Harper's Magazine*, Aug. 1975, p. 66-75; and "The Mike Douglas Show," Oct. 20, 1975.
3. L-5 Society, 1620 N. Park Avenue, Tucson, AZ 85719.

APOCRYPHAL STORY IMPROVED

The giant pendulum experiment described by Professor Henry [Phys. Teach. 13, 364 (1975)] has been performed for many years. After a demonstration, it was customary to remark, "They say that when a student once did this he gave the ball a push as he released it — the result was that physics finished the student before he finished physics." I never heard that anyone was present to save him from his folly.

M. RUSSELL WEHR
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SO THAT'S HOW THEY DO IT!

In response to "Some nutcracker!" appearing in the September issue [Phys. Teach. 13, 383 (1975)], I would like to note that an ingenious method for measuring the force of a shark's jaws is described in the February issue of National Geographic in 1968. The article is entitled "Sharks: Wolves of the Sea." It read (in part):

> Power of a shark's bite measures in tons, not pounds, as Dr. Perry W. Gilbert discovers in tests conducted at the Lerner Marine Laboratory. One of the world's foremost shark authorities, Dr. Gilbert uses a "bite-meter," a cylinder containing an aluminum core of known hardness enclosed by four quadrants of steel. Twelve stainless-steel bearings lie between the two layers.
> Bait wrapped around the device . . . attracts sharks . . . It clamps down hard on the apparent metal, then releases the unpalatable offering. Knowing the force necessary to dent the aluminum core, Dr. Gilbert estimates the dusky (shark's) biting pressure at approximately 18 tons per square inch!

Even though "force" and "power" are used as the same term, I think this shows an interesting method for determining the applied pressure of an unknown "clamp".

RONALD J. BRUNO
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A METHOD OF APPROXIMATING THE IMPORTANCE OF A GIVEN PHYSICIST

After elimination of all differentials the importance of a physicist can be measured by observation in the lobby of a building where the American Physical Society is in session. The importance of a given physicist varies inversely with his mean free path as he moves from the door of the meeting room toward the street. His progress, of course, is marked by a series of scattering collisions with other physicists, during which he remains successively in the orbit of other individuals for a finite length of time. A good physicist has a mean free path of 3.6 ± 0.3 m. The shortest m.f.p. measured in a series of observations between 1945 and 1947 was that of Oppenheimer (New York, 1946), the figure being 2.7 cm. I know, . . . I was waiting for him on the street.

—Stephen White
Physics Today, Vol. 1 No. 1
May, 1948, p. 33

editorial

Noted, in passing

Physics teachers comprise a small group spread thin across the country. We read the articles and texts that some of our members write, and see each other occasionally in small groups at the local and national meetings. Except for AAPT, there isn't much sense of community.

There have been several occasions during the last few years when we have found out by chance that a member of AAPT has died. The magazine has never had any formal column of news about members and so usually we carried no notice of these deaths. We felt particularly bad about the custom when Walter Michels died, although in that case there were columns in both *Physics Today* and the *American Journal of Physics*. Last month, when Francis Sears died, we discovered that a number of our colleagues had missed the report in *The New York Times*. While discussing that problem, we also found that a number of people who knew and had worked with Lou Deall did not realize that Lou had died several years ago.

It's time to start memorializing the deaths of any of our members. We'll start out with a few comments about these three, and invite anyone who hears in the future about the death of one of our colleagues to send us a brief (50 word) obituary.

Walter Michels (1906-1975)

After getting his Ph.D. from Cal Tech in 1930 and doing research on atomic spectra at Princeton for two years, Walter Michels joined the physics department at Bryn Mawr College in Pennsylvania. There he taught for 40 years, and from that base he became a major influence in physics teaching throughout the country. In 1956-57 he was president of AAPT, and from 1959 to 1966 edited the *American Journal of Physics*. Michels was the first chairman of the Commission on College Physics, a major participant in the P.S.S.C., and the Oersted Medallist for 1963. Michels was a large man in every way, exuberant in his love of physics, and generous with his time for his students, his college, and his profession.

Louis Deall (1924-1973)

Lou Deall spent most of his life in St. Louis, as a student at Washington University and as a physics teacher at Normandy High School and Clayton High School. While he was at Clayton he devised a modular physics program that was described in the February 1971 issue of *The Physics Teacher*, and for which he received an AAPT Innovative Teaching Award in 1969. He was active in many other innovative projects in physics teaching, both in his school and in the wider profession. His many friends in the community and at Clayton High School have established in his memory an annual science award for students.

Francis Sears (1898-1975)

Over a million college students learned their physics from the texts written or coauthored by Francis Sears. His academic career was divided between two institutions—MIT, where he studied and then stayed to teach and do research for over 30 years, and Dartmouth, where he went in 1956. He was the president of AAPT in 1959-60, and received the Oersted medal in 1961. Although he did research in his early years (the Debye-Sears effect, for example), it is primarily as a teacher and writer that he will be remembered.

Cliff Swartz